

# NATURAL FARMING FOR CLIMATE RESILIENCE AND SELF-RELIANT AGRICULTURE

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In conventional chemical-based farming practices, indiscriminate use of chemical fertilizers and pesticides adversely affects the beneficial soil micro-flora, leads to the changes in soil nature and also leads to high crop production cost. Heavy metals from the polluted soil may enter into the food chain in significant amounts and exhibit adverse health effects. It not only makes the soil barren but eventually, the farmer goes under debt (Bishnoi *et al.* 2017). Hence, the only way out to deal with this ever-rising problem is Natural Farming. The essence of natural farming is to minimize the external inputs to the farm land, and nurture the in-situ soil fertility. In natural farming, the enrichment of soil occurs through propagation of beneficial soil microbes. It encourages the natural symbiosis process between soil micro-flora and crop plants. Mulching maximizes the moisture loss from the soil, forms the cover for the earthworms and minimizes the weed propagation.

Natural Farming is an art, practice and the science of working with nature to achieve much more with less. It builds on natural or ecological processes that exist in or around farms. It is a diversified farming system that integrates crops, trees and livestock, allowing the optimum use of functional biodiversity. Natural farming relies on traditional techniques and methods, which are designed to work in consonance with nature rather than against it. The goal of natural farming is to create a sustainable and self-reliant agricultural system that requires minimal external inputs (Khadse *et al.* 2018). Natural Farming is a method of farming, where the cost of cultivation is low. The farmer needs not to purchase fertilizers and pesticides in order to ensure the healthy growth of the crops. The method demands locally obtainable natural biodegradable materials supported with scientific

knowledge of ecology and modern technology with traditional farming practices based on naturally occurring biological processes (Devarinti, 2016). This concept was coined by *Shri Subhash Palekar*, for which he was bestowed with *Padma Shri* in 2016. There are several formulations/products used as inputs in natural farming to fulfill the nutritional demand of the crop. It includes *Jeevamrit*, *Ghanjeevamrit*, *Vermicompost*, *etc.* assource of nutrients and microbial inoculum, and other formulations like *Neemastra*, *Brahmastra* and *Agnistra* as bio-control agents.

The history of natural farming can be traced back to Japan in the 1930s when a farmer named Masanobu Fukuoka developed a system of farming that relied on natural processes rather than chemical fertilizers and pesticides. Fukuoka's system, which he called "do-nothing farming", emphasized the use of cover crops, natural compost, and crop rotations to maintain soil fertility and control of pests and weeds.

Natural farming is based on several principles that guide its practices. These principles include:

**No-tillage:** Natural farming avoids plowing or tilling the soil, as this can disturb the soil structure and microbial communities. Instead, natural farmers use cover crops and mulches to suppress weeds and build soil fertility.

**Natural composting:** Natural farming relies on natural composting methods to build soil fertility. This involves using organic matter, such as cover crops, animal manure and kitchen waste to create a rich nutrient-dense soil.

**Crop rotation:** Natural farming uses crop rotation to maintain soil fertility and to control pests and diseases. Crop rotation involves planting different crops in the

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same field over several years to prevent the buildup of pests and diseases.

**Intercropping:** Natural farming uses intercropping, which involves planting different crops together in the same field. Intercropping can improve soil fertility and reduce the risk of pest and disease outbreaks.

**Companion planting:** Natural farming uses companion planting, which involves planting certain plants together to enhance their growth and repel pests. For example, planting marigold with tomato can help to repel nematodes.

**Natural pest control:** Natural farming avoids the use of chemical pesticides and instead relies on natural pest control methods. This includes using companion planting, crop rotation, and biological controls, such as predatory insects and birds.

**Animal integration:** Natural farming integrates animals into the agricultural system to improve soil fertility and pest control. This includes using animals such as chickens and goats to graze cover crops and provide natural fertilizer.

**Table 1. Nutritional Composition in different formulations prepared at Gurukul, Kurukshetra**

Formulation	N(%)	P(ppm)	K(ppm)	Zn (ppm)
<i>Jeevamrit</i>	0.896	2.976	884	1.38
<i>Neemastra</i>	0.672	2.193	1584	3.88
<i>Agniastra</i>	1.176	0.379	709	1.09
<i>Dashparni Ark</i>	2.184	0.339	602	1.83
<i>KhattiLassi</i>	2.80	25.835	430	2.24
Cow urine	1.50	6.788	9000	-

**Source:** Report, IIFSR, Modipuram (2018)

## Methodology

The important principles of natural farming are intercropping, furrow method of cropping, contour and bunds system and using local species of earthworm. There are two types of formulations viz. *Jeevamrit* and *Ghanjeevmarit*, which help in the fulfillment of nutritional requirement of the crops, and the formulations which are used for insect-pest control are mainly *Neemastra*, *Brahmastra* and *Agniastra* (Table 2) (Palekar, 2014). The nutritional composition of different formulations as mentioned in table 1.

## Benefits of Natural Farming

The benefits of natural farming can be seen in several different areas, including the environment, agriculture and society.

## Environmental Impact

Natural farming can have a positive impact on the environment by reducing pollution, preserving biodiversity and promoting sustainable land use practices. By avoiding the use of chemical fertilizers and pesticides, natural farming reduces the amount of harmful chemicals that enter the soil and water, which can have negative impacts on wildlife and human health (Korav *et al.* 2020). Additionally, natural farming methods such as crop rotation and intercropping can promote biodiversity and reduce the risk of soil erosion.

## Agricultural Impact

Natural farming can lead to healthier soils, crops and livestock, which can result in better yields and better product quality. By avoiding the use of synthetic fertilizers and pesticides, natural farming can improve soil health and fertility over time, which can lead to better crop yields. Additionally, natural farming methods such as companion planting and crop rotation can reduce the incidence of pests and diseases, which can improve crop quality. The result of

natural farming has revealed that there is incredible enrichment of soils in terms of organic carbon (OC), available nitrogen, phosphorus, potash, micronutrients and biological health. The average organic carbon in the soil of the natural farming field ranges from 0.61 to 0.65% (IIFSR, Modipuram, 2017). The increase in the mean values of available nitrogen, phosphorus, potassium and micronutrients has also been reported. The available phosphorus, potassium, zinc, iron, copper and manganese were 89, 17, 32, 27, 31 and 117 percent, respectively higher under natural farming compared to conventional farming practices (Gurukul Farm Kurukshetra, 2017-2018).

### **Societal Impact**

Natural farming can have positive impacts on rural communities by promoting self-sufficiency, reducing poverty and improving food security. By relying on natural resources and traditional knowledge, natural farming can help to build local capacity and promote community development. Additionally, natural farming can help to reduce the cost of inputs, making farming more affordable and accessible to small-scale farmers.

One of the main impacts of natural farming is that it can promote sustainable and self-sufficient agricultural systems. By relying on natural processes rather than external inputs, natural farming can reduce the environmental impact of agriculture and promote long-term sustainability. Additionally, natural farming can promote the use of local resources and traditional knowledge, which can help to build resilience and adaptability in the face of changing environmental conditions. By avoiding the use of synthetic fertilizers and pesticides, natural farming can produce crops that are free from harmful chemicals and have a higher nutrient content. It can promote biodiversity and the use of traditional crops, which can help to preserve cultural heritage and promote dietary diversity.

However, it is important to note that the results of natural farming can vary depending on local conditions, including climate, soil type and the availability of resources. Natural farming may not be suitable for all crops or farming systems and may require additional support or infrastructure to be successful. Therefore, it is important to carefully consider the local context and potential challenges before implementing natural farming practices

### **Disadvantage of Natural Farming**

Natural farming also has some challenges. One of the main challenges is that natural farming requires more labor than conventional farming methods. It's because natural farming relies on manual labor rather than external inputs, farmers must spend more time in the field. Additionally, natural farming may have lower yields than conventional farming methods, which can make it difficult for farmers to compete in the global marketplace.

Another challenge of natural farming is that it requires a deep understanding of ecological processes and natural systems. Because natural farming relies on natural processes rather than external inputs, farmers must have a deep understanding of the soil, climate, and local ecology too.

### **Conclusions**

Natural farming in terms of sustainability, saving of water use, improvement in soil health and farmland ecosystem, is considered as a cost-effective farming practices with scope for raising employment and rural development.

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**Table 2. Formulations preparation and their benefits**

S.No.	Ingredients	Preparation	Benefits
1.	<i>Jeevamorit</i>	It is composed of the desi cow-dung (10 kg), urine (8-10 l), jaggery (1.5-2 kg) and dicot flour (1.5-2 kg), water (180 l) and 500 g soil from under the tree. It is applied to the crops with each irrigation cycle or directly to the crops.	It provides nutrients, but most importantly acts as a catalytic agent that promotes the activity of microorganisms in the soil, as well as increases earthworm activity. <i>Jeevamorit</i> also helps to prevent fungal and bacterial plant diseases. <i>Jeevamorit</i> is only needed for the first 3 years of the transition, after which the system becomes self-sustaining.
2.	<i>Ghan jeevamorit</i>	It is basically made up of water (20 l), cow dung (100 kg), Jaggery (1 kg), 2 kg of pulse flour (chickpea, pigeon pea, green gram and black gram), just a handful of soil and little bit urine.	It provides natural nutrients. Provides disease fighting fungus like <i>Trichoderma viride</i> . Promotes plant growth. Attracts local earthworms from 15 ft. soil depth.
3.	<i>Bijamrit</i>	Desi cow dung (5 kg), cow urine (5 l), lime or kali (250 g), water (20 l) and just handful of soil	<i>Bijamrita</i> is a seed treatment, equipped in protecting young roots from fungus as well as from soil- and seed-borne diseases.
4.	<i>Neemastra</i>	It is made up of local cow urine (5 l), cow dung (1 kg) and neem leaves and neem pulp (5 kg) and 100 l of water fermented for 24 h.	It is used for the control of sucking pests & Mealy Bug
5.	<i>Brahmastra</i>	It is prepared by 10 l of desi cow urine, neem leaves (3 kg), custard apple leaves (2 kg), lantern camellia leaves (2 kg), guava leaves (2 kg), pomegranate leaves (2 kg), papaya leaves (2 kg) and white <i>dhatu</i> leaves (2 kg), crushed and boiled in urine.	It is used to control all of the sucking pests, pod borer, fruit borer, etc.
6.	<i>Agniastra</i>	It is composed of 20 l local cow urine and 1 kg of tobacco, 500 g of green chili, 500 g local garlic. For spraying, 2-3 l. <i>Brahmastrais</i> taken in 100 l water.	It is effective against the pests like Leafroller, Stem Borer, Fruit borer, Pod borer

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